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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/632,882	07/31/2003	Praburam Gopalraja	6775	3048

7590

08/18/2005

Patent Counsel
Applied Materials, Inc.
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EXAMINER

VERSTEEG, STEVEN H

ART UNIT

PAPER NUMBER

1753

DATE MAILED: 08/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/632,882

Applicant(s)

GOPALRAJA ET AL.

Examiner

Steven H. VerSteeg

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-45 is/are allowed.
- 6) ☒ Claim(s) 46-50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 July 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 46-50 are rejected under 35 U.S.C. 102(e) as being anticipated by US 2003/0217914 A1 to Miller et al. (Miller)

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C.

102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention “by another,” or by an appropriate showing under 37 CFR 1.131.

3. For claim 46, Applicant requires a reactor system for depositing conductive material onto a substrate comprising target means for sputter depositing a layer of conductive material onto the substrate and for generating a self ionized plasma to ionize a portion of the conductive material sputtered from the target means prior to being deposited onto the substrate; capacitively coupled plasma means including a pedestal electrode for generating a capacitively coupled plasma and for biasing a substrate to attract plasma ions to resputter a portion of the conductive material from the substrate; and electromagnetic coil means for generating a magnetic field to surround

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the pedestal and confine the plasma to increase the density of the plasma adjacent the pedestal electrode.

4. Miller discloses an apparatus for sputtering (Figure 22) comprising target means for sputter depositing and generating a self-ionized plasma [0078]; capacitively coupled plasma means including an RF biased pedestal [0078] and electromagnetic coil means **258** for generating a magnetic field to surround the pedestal and increase the density of the plasma adjacent the pedestal electrode.

5. For claim 47, Applicant requires the target means to include a target comprising a conductive material to be sputtered on the substrate and a magnetron adjacent the target and having an area of no more than about $\frac{1}{4}$ the area of the target and including an inner magnetic pole of one polarity surrounded by an outer pole of opposite polarity with the outer pole flux being at least 50% larger than the inner pole flux. Miller discloses rotating a magnetron about the back of the target with the magnetron having an area of no more than 10% of the target [0085] where the outer pole is at least 1.5 times the flux of the inner pole [0086].

6. For claim 48, Applicant requires the capacitively coupled plasma means to include RF generator means to apply RF energy to the pedestal. Miller applied RF energy to the pedestal [0078].

7. For claim 49, Applicant requires the target to be spaced from the substrate by a distance of at least 50% the diameter of the substrate. Miller discloses providing a chamber with the target 400 mm from a 300 mm wafer [0096].

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8. For claim 50, Applicant requires controller means for inhibiting sputtering by the target while the target material is resputtered from the substrate by the capacitively coupled plasma means. Control means 136 are present that control the resputtering [0078].

9. Claims 46, 48, and 50 rejected under 35 U.S.C. 102(e) as being anticipated by US 2004/0020770 A1 to Wang et al. (Wang)

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention “by another,” or by an appropriate showing under 37 CFR 1.131.

10. Claims 46, 48, and 50 are described above. Wang discloses a magnetron sputter reactor (abstract) comprising target means for sputter depositing a conductive layer onto a substrate and for creating a self ionized plasma [0029]; capacitively coupled plasma means including an RF bias on the pedestal [0029]; and electromagnetic coil means 130 the generate a magnetic field to surround the pedestal. Control means inhibit sputtering by the target during resputtering [0029].

Specification

11. The disclosure is objected to because of the following informalities: “that that” needs corrected at [0022], line 6.

Appropriate correction is required.

Response to Amendment

12. The objection to the drawings presented in the office action mailed April 8, 2005 is withdrawn in light of the amendment.
13. The objection to the specification presented in the office action mailed April 8, 2005 is withdrawn in regards to [0015], but stands in regards to [0022].
14. The 102(e) rejection of claims 46-50 over Miller presented in the office action mailed April 8, 2005 stands.
15. The 102(e) rejection of claims 46, 48, and 50 over Wang presented in the office action mailed April 8, 2005 stands.

Allowable Subject Matter

16. Claims 1-45 are allowed.

Response to Arguments

17. Applicant's arguments filed July 11, 2005 have been fully considered but they are not persuasive.
18. Applicant has argued that Miller does not disclose a "capacitively coupled plasma means" as required by claim 46. I disagree. It is the RF power to the pedestal that meets the limitation. Specifically, claim 46 does not invoke 112-sixth paragraph means plus function because there is too much structure claimed. Thus, my interpretation of the limitation requires a pedestal electrode that would result in capacitively coupled plasma. In Miller, the RF power to the pedestal electrode would meet the limitation. The RF power applied to the pedestal would affect the plasma because the electromagnetic coil 258 pulls the plasma to the pedestal electrode

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(see Figure 23). Because the plasma is pulled to the pedestal electrode and the pedestal electrode is an RF pedestal electrode, the pedestal electrode capacitively couples the plasma.

19. Applicant also argues that Miller does not disclose the electromagnetic coil means claimed by Applicant. I disagree. The electromagnetic coil **258** interacts with the magnetron and side coils (see Figure 23) so that the magnetic field is pulled to the substrate. Because of the location of the pedestal coil and the movement of the target magnetron, the magnetic field would surround the pedestal. The magnetic field around the substrate would increase the density above what would otherwise be present without the magnetic coil.

20. Applicant also argues that Wang does not disclose the capacitively coupled plasma means or electromagnetic coil means. The same logic that applies to Miller applies to Wang. Wang has an RF pedestal electrode. Wang also has the magnetic field pulled down to the substrate (see Figures 2 and 6-8). It does not matter whether or not the magnetron generates the plasma. The fact remains that the RF bias on the substrate interacts with the plasma and hence provides a capacitive coupling to the plasma.

General Information

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (571) 272-1700.

For inquiries involving Recovery of lost papers & cases, sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Denis Boyd at (571) 272-0992.

For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (571) 272-1300.

Conclusion

21. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. VerSteeg whose telephone number is (571) 272-1348. The examiner can normally be reached on Mon - Thurs (6:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Steven H VerSteeg
Primary Examiner
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shv
August 16, 2005